Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Proposed Changes in the Commission's Rules	)	
Regarding Human Exposure to	)	ET Docket No. 03-137
Radiofrequency Electromagnetic Fields	)	

COMMENTS OF THE EMR NETWORK

The EMR Network ("EMR Network") hereby adds to its own initial comments and replies to the comments of others in the captioned proceeding. In our Comments of December 8, 2003 (at 4), we observed that the Notice had put into play the issue of Maximum Permissible Exposure ("MPE") for the "pinna" of the human ear, by referring to a tentative recommendation from an IEEE study group. We agree with the EPA's Norbert Hankin that the IEEE must present "a clear rationale for treating the pinna as an extremity."[1]

The IEEE Local and Metropolitan Area Networks Standards Committee ("IEEE 802") suggests (Comments, 1) that "the research results so far have shown that RF effects are primarily thermal." EMR Network respectfully suggests that the research results on which the current IEEE RF exposure standards -- and the derived FCC standards -- are based is far out of date. Attached are abstracts and summaries, followed by reference citations, that are more representative of recent findings. The plain message in most of this work is that evidence of "effects" from non-thermal radiation is plentiful. The difficult policy question remains: Which

[1] Letter to C.K. Chou, Co-Chair of the IEEE's Subcommittee 4 of the International Committee on Electromagnetic Safety ("ICES-4"), July 16, 2003, appended to the Comments of the EMR Policy Institute dated December 8, 2003.

of these effects are, or could be, harmful to humans?[2] EMR Network continues to hope that the FCC will take the lead in creating a forum for this critical policy debate. None of the other arguably more qualified federal agencies appears able or willing to do so.[3]

We applaud the recognition of Broadcast Signal Lab (Comments, 8) that attempting to classify categorical exclusions by reference to "separate main-beam and off-axis exemptions" would be overly complex. It is far simpler and better for licensees to go through the evaluation exercise in a multi-directional analysis based on total power and separation distances.

We are disheartened by the numerous commenters who propose "grandfathering" of sites categorically excluded under the old rules. Compliance with MPE or SAR standards is an on-going obligation. The Commission would be derelict in its duty to safeguard humans from RF radiation if it were to allow the unexamined continuous operation of a transmitter whose lateral separation distance called for evaluation under the new standards.

Similarly, we are puzzled by the insistence of Cingular Wireless, CTIA and others that vertical distance be reintroduced as a primary criterion in categorical exclusion. The discussion by these commenters seems to assume that the areas of interest are limited by the rooftops on which transmitters often are placed. To the contrary, the Notice (¶8) criticizes the "height above ground" parameter because

> it does not take into account accessible locations that may be adjacent to the transmitting antenna, such as where a tower-mounted antenna is installed next to a building.

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[2] See especially summaries numbered 5, 8, 9 and 10. Thermal effects in the head from the use of cellular telephones are discussed in summary 7, and may be pertinent to the issue of SAR values for the pinna of the ear.

[3] Letter (with Exhibits) of July 25, 2002, to FCC Secretary, from counsel for EMR Network.

Similarly, rooftop antennas may be placed within potentially harmful proximity to nearby apartment windows, such that the height above the roofline is immaterial to the risk of lateral exposure at adjacent buildings.

Respectfully submitted,

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The EMR Network
Abstracts and Summaries of Referenced Studies

1	**Melatonin metabolite excretion among cellular telephone users** **J. B. Burch et al.** **Abstract.** *Purpose:* The relationship between cellular telephone use and excretion of the melatonin metabolite 6-hydroxymelatonin sulfate (6-OHMS) was evaluated in two populations of male electric utility workers (Study 1, n=149; Study 2, n=77). *Materials and methods*: Participants collected urine samples and recorded cellular telephone use over 3 consecutive workdays. Personal 60-Hz magnetic field (MF) and ambient light exposures were characterized on the same days using EMDEX II meters. A repeated measures analysis was used to assess the effects of cellular telephone use, alone and combined with MF exposures, after adjustment for age, participation month and light exposure. *Results*: No change in 6-OHMS excretion was observed among those with daily cellular telephone use >25 min in Study 1 (5 worker-days). Study 2 workers with >25 min cellular telephone use per day (13 worker-days) had lower creatinine-adjusted mean nocturnal 6-OHMS concentrations (p=0.05) and overnight 6-OHMS excretion (p=0.03) compared with those without cellular telephone use. There was also a linear trend of decreasing mean nocturnal 6-OHMS/ creatinine concentrations (p=0.02) and overnight 6-OHMS excretion (p=0.08) across categories of increasing cellular telephone use. A combined effect of cellular telephone use and occupational 60-Hz MF exposure in reducing 6-OHMS excretion was also observed in Study 2. *Conclusions* : Exposure-related reductions in 6-OHMS excretion were observed in Study 2, where daily cellular telephone use of >25 min was more prevalent. Prolonged use of cellular tele-phones may lead to reduced melatonin production, and elevated 60-Hz MF exposures may potentiate the effect.
2	**Childhood cancer incidence in the vicinity of the Sutro Tower, San Francisco** **Neil Cherry** **Abstract**. The Sutro Tower is a prominent feature on an elevated site in central San Francisco It has been operating since about 1970, providing radio and TV signals for the San Francisco Bay area. There has been a long-standing concern about the health effects of this high-powered transmitter in the centre of a large urban population. A data-set is available

	that contains the US white childhood cancer cases from the period 1973-88 with residential locations. A number of previous studies have shown elevated cancer rates in residential populations living in the vicinity of RF/MW broadcast towers. The a priori hypothesis, that RF/MW radiation at residential levels of exposure causes cancer, is tested using this San Francisco data. The data was analysed in relation to geographic factors that influence the RF/MW exposure levels, cancer rates very close to the tower, a three-ring radial analysis, a detailed radial exposure assessment analysis and a cumulative radial analysis. All of the analyses support and confirm the hypothesis and eliminate potential confounding factors. This provides strong and conclusive evidence that RF/MW radiation is carcinogenic and that the Sutro Tower emissions result in highly significantly elevated cancer rates in children in San Francisco.
3	**Semen Analysis of Personnel Operating Military Radar Equipment** **Niels Henrik I. Hjollund et al.** **Summary.** The authors conducted a survey of semen quality among Danish military personnel operating mobile ground-to-air missile units that use several microwave emitting radar systems. Thirty-five males were invited and 19 delivered a semen sample and filled in questionnaires. The proportion of males with oligospermia according to the WHO criterion of 20 million/mL did not differ between missile operators and references and no difference in life style or medical history was found. However, significant differences in median sperm density were observed -- 40 million/mL for the sample vs. 62 million/mL for the reference. Field measurements of exposure to microwaves were carried out. The field levels were of highly fluctuating nature. The maximal mean exposure was estimated to 0.01 $mW/cm^{2.}$ Occasionally short term exposures on the order of 1 mW/cm^2 might occur. These observations were all below the ANSI safety limit based on the heating effects of microwaves of 5 to 10 mW/cm^2 for the actual radar frequencies measured as averaged values over six min.
4	**Microwave sickness: a reappraisal** **B. Hocking** **Abstract.** Microwave sickness (MWS) has been a disputed condition. The syndrome involves the nervous system and includes fatigue, headaches, dysaesthesia and various autonomic effects in radiofrequency radiation workers. This paper describes the early reports of the syndrome from Eastern Europe and notes the scepticism expressed about them in the West, before considering comprehensive recent reports by Western

	specialists and a possible neurological basis for the condition. It is concluded that MWS is a medical entity which should be recognized as a possible risk for radiofrequency radiation workers.
5	**Non-thermal activation of the hsp27/p38MAPK stress pathway by mobile phone radiation in human endothelial cells: Molecular mechanism for cancer- and blood-brain barrier-related effects** **D. Leszczynski et al.** **Abstract.** We have examined whether non-thermal exposures of cultures of the human endothelial cell line EA.hy926 to 900 MHz GSM mobile phone microwave radiation could activate stress response. Results obtained demonstrate that 1-hour non-thermal exposure of EA.hy926 cells changes the phosphorylation status of numerous, yet largely unidentified, proteins. One of the affected proteins was identified as heat shock protein-27 (hsp27). Mobile phone exposure caused a transient increase in phosphorylation of hsp27, an effect which was prevented by SB203580, a specific inhibitor of p38 mitogen-activated protein kinase (p38MAPK). Also, mobile phone exposure caused transient changes in the protein expression levels of hsp27 and p38MAPK. All these changes were non-thermal effects because, as determined using temperature probes, irradiation did not alter the temperature of cell cultures, which remained throughout the irradiation period at 37±0.3°C. Changes in the overall pattern of protein phosphorylation suggest that mobile phone radiation activates a variety of cellular signal transduction pathways, among them the hsp27/p38MAPK stress response pathway. Based on the known functions of hsp27, we put forward the hypothesis that mobile phone radiation-induced activation of hsp27 may (i) facilitate the development of brain cancer by inhibiting the cytochrome c/caspase-3 apoptotic pathway and (ii) cause an increase in blood-brain barrier permeability through stabilization of endothelial cell stress fibers. We postulate that these events, when occurring repeatedly over a long period of time, might become a health hazard because of the possible accumulation of brain tissue damage. Furthermore, our hypothesis suggests that other brain damaging factors may co-participate in mobile phone radiation-induced effects.
6	**Conspicuous behavioural abnormalities in a dairy cow herd near a TV and Radio transmitting antenna** **W. Löscher and G. Käs** **Abstract.** In addition to a considerable reduction of milk yield and increasing occurences of health problems, behavioural abnormalities that have not yet been examined, have been observed over the last two years in a herd of dairy cows maintained in close proximity to a TV and Radio transmitting antenna. The evaluation of possible factors which

	could explain the abnormalities in the livestock did not disclose any factors other than the measurable high-frequency electromagnetic fields. An experiment in which a cow with abnormal behaviour was brought to a stable in a different area resulted in normalisation of the cow within five days. The symptoms returned, however, when the cow was brought back to the stable in close proximity to the antenna in question. In view of the previously known effects of electromagnetic fields it may be possible that the observed abnormalities are related to the electromagnetic field exposure.

7	**Local vasodilator response to mobile phones** **P. Paredi et al.** **Abstract.** *OBJECTIVES*: The use of mobile phones with the resulting generation of potentially harmful electromagnetic fields (EMF) is the focus of public interest. Heat generation and the activation of the inducible form of nitric oxide (NO) synthase may be possible causes of the biological effects of EMF exposure. We investigated if a mobile telephone conversation can modify skin temperature, NO, and nasal resistance. *METHODS*: We studied the effect of an EMF (900 MHz) generated by a commercially available cellular phone during a 30-minute telephone conversation on skin temperature, nasal NO measured by chemiluminescence, and nasal minimal cross-sectional area (MCA) measured by rhinometry. Eleven normal subjects (mean age +/- standard error of mean [SEM], 32 +/- 5 y; 10 male) were studied. *RESULTS*: There was a similar and significant increase in skin temperature of the nostril and occipital area on the same side as the telephone (maximal increase 2.3 +/- 0.2 degrees C at 6 min) as well as a tendency for higher nasal NO levels (maximal increase 12.9 +/- 4.9% at 10 min), whereas the MCA was significantly reduced (maximal decrease -27 +/- 6% at 15 min). Such changes were not recorded when an earpiece was used to avoid the direct exposure to the electromagnetic field. There were no changes in the skin temperature and nasal NO measured on the opposite side to the mobile phone, whereas the MCA was significantly increased (38 +/- 10%). *CONCLUSIONS*: Exposure to EMF produced by a mobile phone produces biological effects that can be easily measured. Microwaves may increase skin temperature and therefore cause vasodilation and reduce MCA. Further studies are needed to study the long-term effects of mobile phone use and the relation among NO production, vasodilation, and temperature.

8	**DNA damage in Molt-4 T-lymphoblastoid cells exposed to cellular telephone radiofrequency fields in vitro** **Jerry L. Phillips et al.** **Abstract.** Molt-4 T-lymphoblastoid cells have been exposed to pulsed signals at cellular telephone frequencies of 813.5625 MHz (iDEN® signal) and 836.55 MHz (TDMA signal). These studies were performed at low SAR (average = 2.4 and 24 μW g^{-1} for iDEN® and 2.6 and 26 μW g^{-1} for TDMA) in studies designed to look for athermal RF effects. The alkaline comet, or single cell gel electrophoresis, assay was employed to measure DNA single-strand breaks in cell cultures exposed to the radiofrequency (RF) signal as compared to concurrent sham-exposed cultures. Tail moment and comet extent were calculated as indicators of DNA damage. Statistical differences in the distribution of values for tail moment and comet extent between exposed and control cell cultures were evaluated with the Kolmogorov–Smirnoff distribution test. Data points for all experiments of each exposure condition were pooled and analyzed as single groups. It was found that: 1) exposure of cells to the iDEN® signal at an SAR of 2.4 μW g^{-1} for 2 h or 21 h significantly decreased DNA damage; 2) exposure of cells to the TDMA signal at an SAR of 2.6 μW g^{-1} for 2 h and 21 h significantly decreased DNA damage; 3) exposure of cells to the iDEN® signal at an SAR of 24 μW g^{-1} for 2 h and 21 h significantly increased DNA damage; 4) exposure of cells to the TDMA signal at an SAR of 26 μW g^{-1} for 2 h significantly decreased DNA damage. The data indicate a need to study the effects of exposure to RF signals on direct DNA damage and on the rate at which DNA damage is repaired.

9	**Nerve cell damage in mammalian brain after exposure to microwaves from GSM mobile phones** **Leif G. Salford et al.** **Abstract**. The possible risks of radio-frequent electromagnetic fields for the human body, is a growing concern for the society. We have earlier shown that weak pulsed microwaves give rise to a significant leakage of albumin through the blood-brain barrier (BBB). Now we have investigated whether a pathological leakage over the BBB might be combined with damage to the neurons. Three groups of each 8 rats were exposed for 2 hours to GSM mobile phone electromagnetic fields of different strengths. We found, and present here for the first time, highly significant ($p<0.002$) evidence for neuronal damage in both the cortex, the hippocampus and the basal ganglia in the brains of exposed rats.
10	**Effects of Global Communication system radio-frequency fields on Well Being and Cognitive Functions of human subjects with and without subjective complaints** **A.P.M. Zwamborn et al.** **Abstract.** In this report a double blind randomized three-way crossover evaluation of general symptoms and cognitive functions with or without exposure to GSM and UMTS-like fields in subjects presenting with complaints subjectively attributed to GSM fields is presented. From our research it is concluded that our hypotheses to find no relation between presence of RF-fields and the measured parameters is rejected. We have found a statistically significant relation between UMTS-like fields with a field strength of 1 V/m and an effect on the Well Being. Further, from the cognitive tasks, it is observed that a number of significant effects is found. Each exposure frequency is associated with changes in some tasks or parameters, while other frequencies are not. In our study, it is shown that the thermal effects are negligible and therefore, an explanation based on thermal effects seems highly unlikely for effects on the cognitive parameters. Without any question, the results justify more scientific research into this area.

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